

We claim:

1. A lower leg prosthesis comprising:
a lower foot plate and an upper foot plate disposed in spaced relationship to each other, wherein the lower and upper foot plates are elongated and are configured to be flexible in directions along a longitudinal axis; and
an elastomeric layer disposed between, and attaching together, the lower foot plate and the upper foot plate, wherein the elastomeric layer extends substantially across an upper surface of the lower foot plate.
2. The lower leg prosthesis of claim 1, wherein the elastomeric layer extends fully to a periphery of the lower foot plate.
3. The lower leg prosthesis of claim 1, wherein the elastomeric layer comprises an upper portion adjacent the upper foot plate, a lower portion adjacent the lower foot plate and a middle portion disposed between the upper and lower portions.
4. The lower leg prosthesis of claim 3, wherein the lower portion extends substantially to a periphery of the lower foot plate.
5. The lower leg prosthesis of claim 3, wherein the lower portion extends substantially to a periphery of the lower foot plate, the upper portion extends generally to a periphery of the upper foot plate and the middle portion extends generally less than the upper foot plate or the lower foot plate in a lateral direction.
6. The lower leg prosthesis of claim 5, wherein lateral facing sides of the elastomeric layer in the middle portion are generally concave.
7. The lower leg prosthesis of claim 5, wherein lateral facing sides of the elastomeric layer in the middle portion are generally convex.
8. The lower leg prosthesis of claim 3, wherein the lower portion is generally planar in an area extending beyond a periphery of the upper foot plate, and wherein the middle portion provides a smooth transition between the upper portion and the planar area of the lower portion.

9. The lower leg prosthesis of claim 3, wherein the middle portion defines a wedge section that extends from a posterior end of the upper foot plate toward a posterior end of the lower foot plate, protruding beyond the posterior end of the upper foot plate.
10. The lower leg prosthesis of claim 1, wherein the elastomeric layer bonds the upper foot plate to the lower foot plate.
11. The lower leg prosthesis of claim 10, wherein the elastomeric layer is the sole bonding between the upper and lower foot plates.
12. The lower leg prosthesis of claim 1, wherein the width of the elastomeric layer is generally narrower than the widths of the upper and lower foot plates.
13. The lower leg prosthesis of claim 12, wherein the elastomeric layer comprises an upper portion adjacent the upper foot plate, a lower portion adjacent the lower foot plate and a middle portion interposed between the upper and lower portions, and wherein the width of the middle portion is generally narrower than the widths of the upper and lower portions.
14. The lower leg prosthesis of claim 1, wherein the lower foot plate is formed of a composite material incorporating high-strength fibers.
15. The lower leg prosthesis of claim 1, wherein the lower foot plate includes a forefoot plate and a heel plate aligned along the longitudinal axis.
16. The lower leg prosthesis of claim 15, wherein:
 - the forefoot and heel plates together have a toe section, a mid-foot section, and a heel section; and
 - the forefoot and heel plates are separated from each other by a first gap located in the mid-foot section.
17. The lower leg prosthesis of claim 16, wherein the first gap has a substantially uniform width in the range of 1 to 12 mm.
18. The lower leg prosthesis of claim 16, wherein the elastomeric layer comprises an anterior section disposed between the upper plate and the forefoot plate and a posterior

section disposed between the upper plate and the heel plate, wherein a second gap is defined between the anterior and posterior sections, adjacent the first gap.

19. The lower leg prosthesis of claim 18, wherein the second gap has a substantially circular cross-section.

20. The lower leg prosthesis of claim 18, wherein the second gap blends smoothly with a lower surface of the upper plate and with upper surfaces of the forefoot and heel plates.

21. The lower leg prosthesis of claim 18, wherein the first and second gaps both are substantially straight and oriented substantially perpendicular to the longitudinal axis.

22. The lower leg prosthesis of claim 16, wherein:

the forefoot plate and the heel plate both are formed of a composite material incorporating high-strength fibers;

the forefoot plate has a thickness that varies along its length, from a maximum at the forefoot plate's anterior end to a minimum at the forefoot plate's posterior end; and

the heel plate has a thickness that varies along the heel plate's length, from a minimum at the heel plate's anterior end to a maximum at the heel plate's posterior end.

23. The lower leg prosthesis of claim 1, wherein the elastomeric layer incorporates a solid, high-density polyurethane.

24. The lower leg prosthesis of claim 1, wherein the elastomeric layer has a thickness of at least about 2 mm over the outer portion of the lower foot plate.

25. A lower leg prosthesis comprising:

a curved upper foot plate configured to be flexible in a longitudinal direction;

a lower foot plate disposed below the upper foot plate, the lower foot plate including a heel portion for accommodating heel strike; and

an attachment device coupled to the upper foot plate and adapted for connection to an external prosthetic component, the attachment device including a lower surface that generally conforms to a sloping portion of the upper foot plate.

26. The lower leg prosthesis of claim 25, wherein the attachment device further comprises a mounting portion oriented generally horizontal for connection to an external prosthetic component.
27. The lower leg prosthesis of claim 26, wherein the mounting portion is opposite the lower surface of the attachment device, and wherein the lower surface and the upper foot plate slope downwardly toward a front portion of the upper foot plate.
28. The lower leg prosthesis of claim 26, wherein the mounting portion comprises a pyramid adapter oriented generally vertical.
29. The lower leg prosthesis of claim 25, wherein the attachment device comprises a wedge-shaped portion having a lower surface that conforms to the sloping portion of the upper foot plate and including a generally horizontal upper surface for mounting to an external component.
30. The lower leg prosthesis of claim 29, wherein the attachment device further comprises a mounting protrusion.
31. The lower leg prosthesis of claim 30, wherein the mounting protrusion is oriented generally vertical.
32. The lower leg prosthesis of claim 30, wherein the mounting protrusion comprises a pyramid adapter.
33. The lower leg prosthesis of claim 25, wherein the attachment device is bonded to the upper foot.
34. The lower leg prosthesis of claim 25, wherein the attachment device attaches to the upper foot plate using mechanical fasteners.
35. The lower leg prosthesis of claim 25, wherein the upper foot plate comprises an upper surface and a lower surface with the lower surface facing the lower foot plate, and the lower leg prosthesis further comprises a backing component configured for placement generally adjacent the lower surface of the upper foot plate and disposed generally below the

attachment device, and wherein the attachment device attaches to the upper foot plate using a mechanical fastener coupled to the backing component.

36. The lower leg prosthesis of claim 35, wherein the backing component comprises at least one threaded opening and wherein the mechanical fastener threads into the threaded opening.

37. The lower leg prosthesis of claim 36, wherein the backing component comprises a plurality of threaded openings and wherein a plurality of mechanical fasteners thread into the plurality of threaded openings, respectively.

38. The lower leg prosthesis of claim 25, wherein the attachment device is formed from one or more of metals, ceramics, composites and plastics.

39. The lower leg prosthesis of claim 25, wherein the attachment device is configured for weight reduction.

40. The lower leg prosthesis of claim 39, wherein the attachment device comprises a weight reducing portion formed by removal of material.

41. The lower leg prosthesis of claim 40, wherein the weight reducing portion comprises a cutout formed in a forward facing portion of the attachment device.

42. The lower leg prosthesis of claim 25, further comprising an elastomeric layer disposed between the lower foot plate and the upper foot plate.

43. The lower leg prosthesis of claim 42, wherein the elastomeric layer extends across a substantial portion of an upper surface of the lower foot plate.

44. The lower leg prosthesis of claim 42, wherein the elastomeric layer extends over a substantial portion of a lower surface of the upper foot plate.

45. The lower leg prosthesis of claim 42, wherein the upper foot plate comprises an upper surface and a lower surface with the lower surface facing the lower foot plate, and the lower leg prosthesis further comprises a backing component configured for coupling with the attachment device, and wherein the elastomeric layer comprises at least one recess

configured to receive the backing component so as to locate the backing component generally adjacent the lower surface of the upper foot plate and generally below the attachment device, the attachment device attached to the upper foot plate by coupling to the backing component.

46. The lower leg prosthesis of claim 42, wherein the upper foot plate comprises an upper surface and a lower surface with the lower surface facing the lower foot plate, and the lower leg prosthesis further comprises a backing component configured for placement generally adjacent the lower surface of the upper foot plate and disposed generally below the attachment device and generally within the elastomeric layer, and wherein the attachment device attaches to the upper foot plate using a mechanical fastener coupled to the backing component.

47. The lower leg prosthesis of claim 25, wherein the lower foot plate includes a forefoot plate and a heel plate aligned along a longitudinal axis.

48. The lower leg prosthesis of claim 47, wherein:
the forefoot and heel plates together have a toe section, a mid-foot section, and a heel section; and

the forefoot and heel plates are separated from each other by a first gap located in the mid-foot section.

49. The lower leg prosthesis of claim 48, wherein the elastomeric layer comprises an anterior section disposed between the upper plate and the forefoot plate and a posterior section disposed between the upper plate and the heel plate, wherein a second gap is defined between the anterior and posterior sections, adjacent the first gap.

50. The lower leg prosthesis of claim 49, wherein the first and second gaps both are substantially straight and oriented substantially perpendicular to the longitudinal axis.